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SCIENCE REVIEW OF THE YEAR

SCIENCE NEWS LETTER

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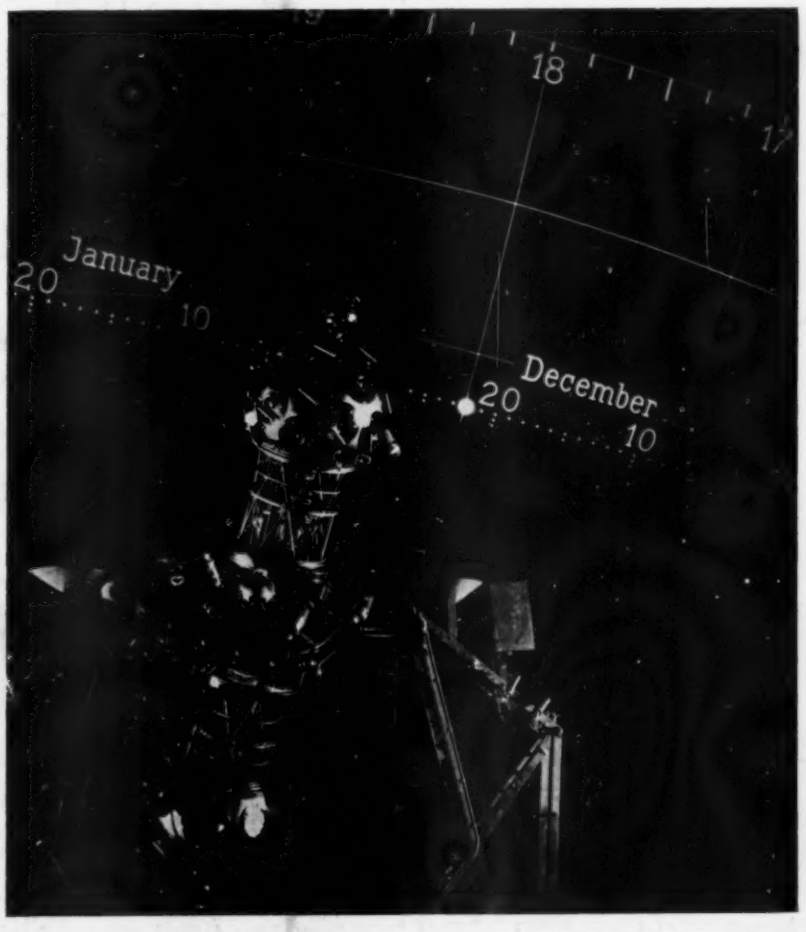
THE WEEKLY SUMMARY OF CURRENT SCIENCE •



December 21, 1940

New Season

See Page 393

A SCIENCE SERVICE PUBLICATION

Do You Know?

One-fifth of the world's land is *desert.*

Sauerkraut was a popular food of ancient Egypt.

Poison ivy berries are a favorite winter food of many birds.

Red blood corpuscles appear red only when massed together.

Australia is the only continent with no *international boundaries.*

Single *cotton fibers* are 1,200 to 4,000 times as long as they are thick.

Some of ancient Egypt's wide-bottom *bottles* resemble Erlenmeyer flasks.

All state *capitals,* except Boston, Mass., and Frankfort, Ky., showed population increases in the 1940 census.

QUESTIONS DISCUSSED IN THIS ISSUE

Most articles which appear in* SCIENCE NEWS LETTER *are based on communications to Science Service, or on papers before meetings. Where published sources are used they are referred to in the article.

ASTRONOMY

In what rare position have sunspots been observed? p. 392.

What astronomical task has been undertaken by Russian observatories? p. 392.

What may we expect to happen when the tail of Cunningham's Comet engulfs the earth? p. 396.

BACTERIOLOGY

What very practical use has been found for the odors generally associated with heaven and with the nether regions? p. 393.

CHEMISTRY

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CHEMISTRY-MEDICINE

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GENERAL SCIENCE

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MEDICINE

In what way does the new sulfa drug protect those who must have surgical operations on the alimentary canal? p. 391.

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NUTRITION

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PHYSICS

What obstacle to obtaining atomic power has now been removed? p. 394.

PHYSIOLOGY

In what experiments was hope lost for the banishment of gray hair by a vitamin? p. 393.

What has been recently discovered about human growth in the very earliest stages? p. 395.

ZOOLOGY

What did the "fossil snake" sent to the Smithsonian turn out to be? p. 392.

Christmas Meetings

Coming issues of the Science News Letter will contain reports by the Science Service staff of important end-of-the-year scientific meetings. These will include:

American Association for the Advancement of Science and affiliated societies, Philadelphia, Dec. 27-Jan. 2.

American Chemical Society, Physical and Inorganic Chemistry Symposium, New York, Dec. 30-Jan. 1.

American Chemical Society, Industrial and Engineering Chemistry Symposium, Princeton, Dec. 30-Jan. 1.

Archaeological Institute of America, Baltimore, Dec. 26-28.

Geological Society of America and associated groups, Austin, Texas, Dec. 26-28.

American Historical Association and related groups, New York City, Dec. 27-28.

Society of American Bacteriologists, St. Louis, Dec. 27-29.

American Statistical Association and related groups, Chicago, Dec. 26-28.

American Economic Association, New Orleans, Dec. 27-30.

Cottonseed cake is being mixed with coal as locomotive fuel in Egypt.

The *library* of ancient Alexandria, Egypt, had nearly a million rolls of manuscript writings in its prime.

Egyptians enjoyed something resembling *fruit cake,* chemists judge by examining bread with fruit in it, made 3,500 years ago.

Substituting for Italian *olive oil* is a new American product in which corn oil blends with a little olive oil with good results.

Darning eggs that light up inside by a small electric bulb are new, for housewives abroad who darn socks during blackouts.

The British government has turned out several million pairs of small *ear plugs* for the public, to protect ear drums against war noise.

A *Christmas tree* will keep fresh and be less inflammable if the end of the trunk is cut off diagonally about an inch above the original cut and the tree then stands in a water-filled container.

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REVIEW OF THE YEAR

Defense Research Marks 1940

Electron Microscope Opens New World; Brightest Comet Since 1910; Vaccines for Influenza, Measles

This summary of the year's happenings in the world of science is limited by space to just the highlights. Most of the events are described in detail in the pages of the SCIENCE NEWS LETTER *for the current year. If you wish to refer to any particular report you may find it readily through the index. (See SNL, June 29 and also the issue which will appear next week, December 28.)*

By SCIENCE SERVICE STAFF

WAR and defense effort accelerated applied research in the physical sciences and medicine and slowed searchings for knowledge in many other fields during 1940.

In the realms of the minute, the electron microscope peered into germs and saw molecules of matter, the search for atomic power from uranium progressed shrouded in secrecy for defense reasons. In the air, faster and more deadly airplanes, a successful helicopter, and more aeronautical research facilities. In the skies, the brightest comet since 1910, and a triple star. In the animal world, a "new" large mammal, the kouprey, first of major size since the okapi. For our health, vaccines against influenza and measles, continued chemical warfare against disease. For sick minds, successful therapy through electric shocks.

These were some of the highlights of science in 1940.

Science Service's annual survey of science shows these outstanding accomplishments and events:

AERONAUTICS

New Plane Types Built; Production Speeded Up

A successful helicopter made in the United States and an autogiro capable of vertical takeoff were demonstrated.

A new interceptor fighter plane, capable of ascent at a speed of more than a vertical mile a minute, was demonstrated.

The Allison engine, America's principal contribution to the art of liquid cooled aircraft engines, was perfected to the point of going into quantity production in the General Motor's Indianapolis plant.

Military airplanes attained speeds exceeding 400 miles per hour.

Air-cooled airplane engines developing more than 2,000 horsepower were developed.

The world's largest land passenger airplanes, with a daytime passenger capacity of 42 passengers, weighing 25 tons and powered with four engines, went into production.

Exhaust driven turbo superchargers permitted airplanes to fly faster and higher.

Air transport planes began to carry passengers in pressurized cabins above the weather.

The keel was laid for the world's largest flying boat, destined for the U. S. Navy.

Federal control of aviation was changed with the abolition of the Civil Aeronautics Authority and the creation of the Civil Aeronautics Board and the Civil Aeronautics Administration.

Military air service in the United States was aided when an air officer was made deputy Chief of Staff and a Lieutenant-General was placed in charge of the G. H. Q. Air Force.

Experiments were carried out which indicate that airplanes can be made successfully from plastics.

New aviation fuels that increase safety by reducing greatly the fire hazard, were developed experimentally.

Motion pictures were taken at 40,000 frames per second using an NACA high-speed camera in the study of knocking combustion in aircraft engines.

An elaborate government program to train civilians as pilots, especially among college students, was started.

Trans-Atlantic aviation was subjected to unusually heavy traffic because of the disruption of steamer service on account of the war.

Air service from the United States to New Zealand and Australia was inaugurated.

New air routes into China kept that nation in touch with the outside world despite the Japanese invasion.

An airplane was for the first time certified by the government as being stall-proof and spin-proof.

Building of English type airplane engines was started in the United States.

A program to build large numbers of airplanes for U. S. defense was started.

New laboratories for aviation research were begun by the National Advisory Committee for Aeronautics at Moffett Field, Calif., and at Cleveland, Ohio.

Engineers developed a new ultra-high frequency radio compass system for airplanes, which sends out a beam that sweeps around the horizon sixty times a second.

AIRACUDA

A new Army plane with the emphasis on speed and fire-power. It carries a crew of six and has a cannon in the nose of each engine nacelle. Machine gun nests are concealed on top of and beneath the fuselage. The plane flies at 300 miles per hour and has a range of 2,500 miles. It is a new design by the Bell Aircraft Corp.

ANTHROPOLOGY AND ARCHAEOLOGY

Navajo Indian Language Put Into Written Form

Navajo Indians saw their language put into alphabetic writing for the first time.

GOOD HUNTING

You seldom see such a hunter's dream as this concentration of canvasbacks on Lake Merritt in California, but protective regulations are bringing an increase in these highly-prized ducks. The photograph is an official one of the U. S. Fish and Wildlife Service.

New equipment made it possible to play safely thousands of frail cylinder records on which scientists have preserved folk music and primitive songs.

Turning a crank, an archaeologist of today buried the Time Capsule at the New York World's Fair, packed with exhibits and records of our civilization for the archaeologists of 6939 A. D.

War in Europe endangered such irreplaceable antiquities as the Rosetta Stone (London), the Elgin Marbles (London), bust of Queen Nefertiti (Berlin), and temples and monuments in Athens and many other cities.

Discovery in Java of a fourth skull of Pithecanthropus provided scientists with the first chance to study a grown male skull of this ancient pre-human genus.

The undamaged silver coffin and golden ornaments of Pharaoh Psousennes I found in the Egyptian Delta were pronounced in some respects as important a find as the Tutankhamen tomb.

The sanctuary at Samothrace where the famous "Winged Victory" once stood was excavated, shedding new light on Greek mystery religions.

Pronounced the world's oldest "steel" weapon, a battle axe found in Syria shows skill of munition makers of 1500 B. C.

The American scientific achievement of surveying from the air Iran's ruined cities and unexplored mounds will greatly aid future archaeological digging there, the first published report of the survey showed.

Better understanding of King Solomon's empire-building and trade expansion ventures was gained, as an American expedition completed excavation of Ezion-geber, Solomon's combined seaport, factory town, and naval base by the Red Sea.

Measurements of more than 2,000 native blacks in the Solomon Islands provided valuable aid for solving the mystery of Negro past in Melanesia.

A world-wide survey of Polynesian culture relics in museums was brought almost to completion, despite conditions abroad.

The 1940 Census showed that population of continental United States has increased 7.2% in 10 years to a total of 131,669,275; while preliminary figures based on the census returns give the entire United States with its territories and possessions a population of 150,621,720.

The first meeting of governments to confer on economic and social problems of 30,000,000 Indians in the Americas was held in Mexico.

The Coronado Cuarto-Centennial celebrated in the Southwest stimulated historic and archaeological study of the Spaniard's route.

Explorations at Sandia Cave, New Mexico, added to knowledge of Sandia Man, recently-found aboriginal American so ancient that his campfire refuse lies beneath that of Folsom hunters.

Three successive eras of Folsom Man's career in early America were traced by finding a stratified corner of the Lindenmeier site in Colorado.

Three types of prehistoric American culture, dated by geological evidence at about 6000 B. C., 2000 B. C., and the dawn of the Christian era, were reported at a lake bed of southern Oregon.

Excavating the oldest town yet found in Arctic Alaska, an expedition traced well planned streets with more than 600 homes, and unearthed burials stored with art and cultural objects perhaps 2,000 or 3,000 years old.

An old Panama graveyard revealed the burial of an Indian official in gold regalia and surrounded by sacrificed slaves or captives.

Assembling massed bones of Chief Powhatan's buried tribesmen provided evidence for a better picture of the typical Virginia Indian encountered by colonists.

Appearance of the famous Hopewell Mound Builders of the Ohio Valley became less mysterious, as scientists, examining skulls of these Indians, found them a long-headed race, with a custom of artificially narrowing the forehead in childhood.

Five colossal stone heads and other remarkable art objects unearthed in Tabasco Province, Mexico, added to knowledge of the Olmec Indian civilization which preceded the Toltecs.

ASTRONOMY

Naked Eye Comet Is Year's Most Spectacular Event

Five comets were discovered, four were new ones, one the return of a periodic comet found in earlier years: Kulin, periodic Whipple, Cunningham, which has attained naked eye visibility as the brightest comet since 1910, a new Whipple and Okabayasi.

By means of photographic observations of the effect it produced on two visible stars, an invisible companion was discovered to the double star system Zeta Aquarii.

The probable relationship between Encke's comet and meteors of the Taurid shower, which appear in the autumn, was demonstrated; both the meteors and the comet are apparently the remains of a larger comet of the past.

Taking into consideration new measures of their distances, the diameters of the largest known stars were recalculated, giving first place to Ras Algethi, in the constellation of Hercules, with 690,000 miles, and demoting Antares, formerly supposed to be largest, to fourth place.

Four exploding stars, of the type known as "super-novae," were discovered in distant star systems.

Fifteen "white dwarfs," stars of extreme density, weighing many tons to the cubic inch, were located.

From a study of the frequency of giant stellar explosions in distant galaxies it was estimated that a tenth of the stars in our own system might have exploded since the cooling of the earth's oldest rocks.

Shells of gaseous iron, discovered around certain stars afforded a clue to possible new facts with important earthly applications.

A theory to explain mysterious changes in the spectrum of the star beta Lyrae was advanced, suggesting that the star had the shape of an hour-glass, and a curved, comet-like tail.

A rare transit of the planet Mercury across the face of the sun, last until 1953, occurred on Nov. 11, and was widely observed, despite bad weather.

The five naked-eye planets, Mercury, Venus, Mars, Jupiter and Saturn, were lined up in the western sky in a rare formation.

A theory was advanced that the planet Venus is covered with clouds of solidified formaldehyde, deadly gas used on earth as a disinfectant.

Theories that the planetary system was formed by condensation of a great gaseous mass pulled out of the sun were shown to be untenable by a demonstration that such a mass would not condense but would dissipate.

The cosmic dust which permeates interstellar space was found to be very unevenly distributed.

The iron in meteorites was found to contain the same forms or "isotopes" and in the same proportions as iron originating on earth.

The world's highest astronomical observatory was established at Fremont Pass, Colo., an altitude of 11,318 feet, as a branch of the Harvard College Observatory for study of the sun's corona without an eclipse.

A reflecting telescope with a five-foot diameter mirror was placed in operation at the Argentine National Observatory in Cordoba.

A telescope attachment known as the "quartz monochromator" made possible a new way of observing the flame-like prominences on the sun.

A new tower telescope and laboratory building, for motion picture studies of the sun, was dedicated at the McMath-Hulbert Observatory of the University of Michigan.

Cook Observatory, at Wynnewood, Pa., one of the finest of amateur institutions, was turned over to the University of Pennsylvania following the death of its founder, Dr. Gustavus Wynne Cook.

Improved designs of the now-famous Schmidt camera for astronomical photography were suggested, and a large new telescope of this type was completed at the Oak Ridge Station of the Harvard College Observatory.

Studies of an eclipse of the moon in Oct. 1939, completed during the year, showed that an inch thick layer of pumice on its surface would explain the observed rate of cooling.

On April 7 an annular eclipse of the sun was visible in the southern United States and observations were made of the infra-red light from the sun's rim as the moon covered the center of the disc.

The path of totality of a solar eclipse on Oct. 1 passed over Brazil and South Africa, but, in the former, cloudy weather hampered many of the observations.

BIOLOGICAL SCIENCES

New Wild Ox Described; Plants Make Food in Dark

A hitherto undescribed large mammal, the kouprey or wild ox of Indo-China, was introduced to science; it is the first "new" mammal of major size to be described since the discovery of the okapi more than a generation ago.

One-celled green water plants were discovered to be able to absorb carbon dioxide and form food in the dark, also to make use of hydrogen as an energy source.

Green plants were discovered to be able to manufacture a bacteriophage to protect themselves against germ diseases, and molds were also found to produce a bacteria-killing substance.

Plant disease viruses, hitherto known only as parasites, were found to be able to feed on non-living materials.

Plants recovering from certain virus diseases were found to have acquired immunity to further attacks.

Discovery of a highly fatal disease of Japanese beetle larvae gave hope of establishing biological control of this pest.

A new kind of chlorophyll was found in a variety of jimsonweed artificially "evolved" by X-ray bombardment.

Close observation of developing embryos in eggs was made possible by invention of a technique involving making of windows in ends of eggshells.

Green plants give off very faint flashes of red light while making food, it was discovered.

Ability of cockroaches to get along without vitamin A, supposed to be essential to all life, was discovered.

White pines resistant to blister rust were discovered in Wisconsin.

It was discovered that the value of rabies vaccine for dogs could be tested on mice.

Barro Colorado island in Gatun lake became a U. S. government project, where scientists may study tropical animals and plants under natural wilderness conditions.

Pigmy hippos and other rare animals were brought back from Liberia by an expedition from the National Zoological Park.

The 3,000-head buffalo herd at Wainwright Park, Alberta, was slaughtered to make room for a great flying field.

A fatal epidemic among sponges in Florida and West Indian waters appeared in the spring, and abated in autumn after killing a large percentage of the most valuable sponges.

Sulfanilamide was found to be a stimulant for formation of roots on plant cuttings.

The chromosome number in the chimpanzee was found to be 48, the same as in man.

Multiple cropping, producing two or more kinds of plants in the same tank at the same time, was the newest development in hydroponics, or soilless gardening.

A short-legged coyote, built on dachshund lines, was found in California.

The Leidy Medal, awarded once in three years to an outstanding researcher in the natural sciences, was presented to Prof. W. L. Fernald, Harvard University botanist.

International good will among scientists was signalized in the award to Sir Arthur William Hill, director of the Royal Botanic Gardens at Kew, England, of the George Robert White Medal of the Massachusetts Horticultural Society.

The National Academy of Sciences awarded the Agassiz medal for Oceanography to Dr. Frank R. Lillie, past president of the Woods Hole Oceanographic Institution.

CHEMISTRY AND PHYSICS

Power From the Atom Is Brought a Step Nearer

Atomic power, long a dream of science, was brought a step nearer with the actual isolation of minute quantities of Uranium 235, the form, or isotope, of this metal which when once started disintegrating by bombardment with atomic fragments, continues the process with the liberation of tremendous amounts of energy.

Produced commercially for the first time in the United States, a microscope which sees with electrons instead of light, opened many new fields in medical, physical and industrial research.

Pictures made with the electron microscope showed the true form of the silver grains of the photographic image; formerly believed to be like lumps of coke, they proved to resemble masses of seaweed.

Experiments with the klystron tube using large amounts of power at ultra-high frequencies were successful in transmitting wireless power a distance of many feet.

Cyclotrons, powerful atom smashers and machines for making artificially radioactive substances, increased in number, with 16 in the United States finished or under construction; one of which will have magnets 184 inches in diameter and will cost $1,400,000.

A million-volt X-ray outfit, adequate for deep therapy and for examination of castings, yet small enough to wheel through an ordinary door and operable from an ordinary lighting circuit, was demonstrated.

Preparation of artificially radioactive elements advanced rapidly, with the first preparation of one, radioactive yttrium, that may have important industrial applications.

Measurements of the energies binding together the protons and neutrons of which the hearts of atoms are built were accomplished by bombarding carbon and paraffin with high energy neutrons, the atom-smashing bullets.

An electron induction accelerator was developed, from which electrons are emitted with energies of 2,300,000 volts, equivalent to those from ten milligrams of radium.

The total eclipse of the sun, visible in Brazil, was found to have an effect on the cosmic rays.

To learn more about cosmic rays, they were studied from many places, including Little America, India, a mountain top in Colorado, and unmanned clusters of balloons sent 12 miles or more into the air.

The mesotrons, an important part of the cosmic rays reaching the earth and which are formed high in the air when the atmospheric atoms are struck by other rays from outer space, were found to have a short life, a few millionths of a second.

Neutrons, atomic particles having no electrical charge, were found to be associated with the cosmic radiation, and experiments were started to measure them at various latitudes to correlate them with other forms of the cosmic rays.

A photograph was obtained showing a mesotron, one of the heavy weight kind of electrons that occur in cosmic rays, disintegrating into an ordinary electron, thus confirming a prediction.

A new theory of relativity was devised which makes space flat instead of curved and explains puzzling experiments which seemed to show a drift of space through the "ether."

Radio waves transmitted by atoms were discovered and measured, making possible great improvements in the accuracy of measuring such subtle properties of atoms and molecules as the magnetism of their component parts. This work by Dr. I. I. Rabi, of Columbia University was awarded the $1,000 prize of the A.A.A.S.

Methods were found by which the invisible films on glass that prevent reflection and increase the efficiency of lens systems could be made as permanent as the glass itself.

Pressures as high as 3,500,000 pounds per square inch were obtained in laboratory experiments, to duplicate the pressures to which materials are subjected far underground.

Franklin medals were awarded to Dr. Arthur H. Compton, University of Chicago physicist, and Dr. Leo H. Baekeland, chemist, inventor of bakelite and velox photographic paper.

The Royal Society conferred its Copley Medal on Prof. Paul Langevin, French physicist; while its Davy Medal went to Prof. Harold C. Urey, of Columbia University, discoverer of heavy hydrogen, and the Hughes Medal to Prof. Arthur H. Compton, of the University of Chicago, authority on cosmic rays.

Two new methods of making three dimensional photographs as prints that do not require the old-fashioned stereoscope to view them were introduced.

The natural process by which glucose is converted in plants into starch was duplicated in the laboratory for the first time, pointing the way to possible synthesis of foods.

A new synthetic rubber was announced, made from gases formerly wasted in oil refineries, which is much more stable than natural rubber because of the structure of its molecules; and tires, made from another kind of synthetic rubber, were placed on the market.

Melamine was made commercially in large quantities and used in a new family of resins for molding and enamels.

A new chemical treatment was developed that makes hard wood soft and plastic while hot and permits a return to natural stiffness and strength upon cooling.

A method was found by which zeolites, materials widely used in water softening, can be used to separate the isotopes or twin forms of various elements; it may prove useful in obtaining atomic power-producing isotope 235 of uranium.

(*Turn to page* 398)

GENERAL SCIENCE

Science Is Mobilized for Defense of the Nation

Committees Organized to Coordinate and Initiate Research; Progress Made Toward Preventing Shortages

AMERICAN science turned its efforts during 1940 to defense preparations. Thousands of scientists began work on research tasks intended to aid the armed forces. In some cases fundamental research programs were laid aside to allow work on problems of military importance.

In cooperation with Army and Navy, defense committees of scientists were organized, among them the National Defense Research Committee, medical committees under the National Research Council and the National Inventors Council.

The National Roster of Scientific and Specialized Personnel, a giant directory of America's technical manpower, was begun.

Speeding of America's defense preparations began after Hitler's westward march in May. As industry rushed to provide more airplanes, munitions and supplies for both U. S. troops and anti-totalitarian military forces, scientists set their brains to devising new weapons and protection against new and old modes of warfare.

Secrecy enveloped these military researches. The traditional announcement of research results to the whole world was foregone in the case of defense research because of the danger of giving information to possible enemies.

The smaller nations of Europe, either invaded or surrounded by the military conquests of the dictators, had their intellectual development blighted by the aggression upon them. France became a conquered country, with many scientists in exile. British scientists struggled on, aiding in the war and seeing their great institutions disorganized and in some cases wrecked by Nazi bombs.

The exchange of scientific information between nations in many cases dwindled to a trickle. Interrupted transport and censorship delayed communication of scientific news as well as other sorts.

In the western hemisphere, the scientific relations between the nations of the two Americas were bettered by the holding of the Eighth American Scientific Congress in Washington. Further collaboration between the American republics in cultural pursuits is taking place.

While the war became more violent and wide-spread, there was thinking and planning as to what can be done to reorganize the world when peace is possible. Scientists played a part in these efforts.

An important by-product of the war and defense efforts is the application of the newer knowledge of nutrition to everyday living. Scientists have shown the need of various hitherto unrecognized food factors. But the introduction of these into the daily diet is another matter.

England has made compulsory the addition of thiamin or vitamin B_1 to white flour for bread. Thiamin has become recognized as the morale vitamin, that improves health, physical vigor and mental alertness. In the United States a new kind of flour with this vitamin added will probably be used in Army rations and made available for use by the general population.

The importance of the B vitamins to health won added recognition. Pantothenic acid, one of the B complex, was shown to be necessary to human nutrition and it was synthesized. Riboflavin, another one of the B vitamins, was shown to be important to human health. These, too, may soon be added to foods in order that they may be widely available, just as thiamin will reinforce flour used in bread.

A shortage of scientific and technical orders began to develop as the American defense program got underway. Engineering schools inaugurated short courses to give intensive training. Some branches of industry searched for engineers and research workers with experience. Some training schools for mechanics went on almost a 24-hour schedule, like the factories they are to supply.

The war interfered with the 1940 award of the Nobel prizes. Sweden, hemmed in by Nazi conquests, decided to postpone the science awards until later.

As America's first peace-time drafted army was being organized, scientists and educators were doing their best to retain trained research workers, teachers and students in their normal roles so that research may go on and the supply of technically trained men and women will not be interrupted. There was hope that the mistakes of other nations, which put their essential specialized personnel into uniform, were to be avoided.

Progress was made toward making America independent of essential raw materials from overseas. Synthetic rubber factories, making several kinds of rubbers, were begun as insurance against curtailment of rubber from the Far East. A possible shortage of tin was foreseen and steps were taken to use the Bolivian ores which are closer to the United States than the usual Malaysian sources. Manganese deposits in Cuba and Montana were exploited to supply much of this necessary steel ingredient used in the United States.

Science enters into 1941 under full draft, with many more tasks to accomplish, determined to make the nation safe against outside aggression and preserve democracy and freedom within.

Science News Letter, December 21, 1940

TO AVOID BLACKOUT

Harold A. Breeding, General Electric engineer, is demonstrating how a blue glass will let through incandescent light, or daylight, but will exclude sodium light. The sodium light, he believes, may be used in combination with the blue glass in factories in blackout areas when it is necessary to operate at night. Special glass is not necessary, for the blue is applied by spraying on a clear varnish mixed with a commercial dye.

MEDICINE

New Sulfa Drug May Save Patients Needing Operations

Unlike Other Sulfanilamide Relatives, It Stays In Intestinal Tract, Cleaning Up Infection There

SPECTACULAR results with a new sulfa drug in fighting germs that threaten lives of patients requiring operations for cancer or other diseases of the lower alimentary tract were announced by Dr. Warfield M. Firor, acting chief surgeon, Johns Hopkins Hospital, and acting professor of surgery, Johns Hopkins Medical School, at the meeting of the Southern Surgical Association in Hot Springs, Va.

The new sulfa drug is sulfanilylguanidine. This is the first report of its use on patients. Tests of it on animals, reported in September by Dr. E. K. Marshall of Johns Hopkins Medical School, showed that it might prove very effective in fighting such intestinal tract diseases as bacillary dysentery and typhoid fever.

These tests showed that the new drug was fairly soluble in water but that, unlike other of the sulfa drugs, it is very poorly absorbed from the digestive tract. This means that almost all of it stays in the lower alimentary canal where it is needed to blitzkrieg the germs there in cases of dysentery or in other conditions.

This lower end of the digestive tract always has germs in it. So long as they remain in the alimentary canal, most of these germs normally present do no harm. When, however, the surgeon must open the canal to remove a cancer or for other reasons, the germs have a chance to get out into other parts of the abdomen and cause serious, frequently fatal infection in spite of all the care the surgeon takes to prevent infection in the wound.

Dr. Firor reports finding that giving patients the new sulfa drug before operation frees the alimentary canal of germs. In every case so far the wounds have healed without infection. Every patient has survived the operation, although mortality in operations of this type at the very best hospitals has been as high as 10% or 15%. Patients not only survive the operation with the aid of the new drug but can go home from the hospital much sooner than usual because the wound, being free from infection, heals more rapidly.

The fall in number of germs in the alimentary canal when blitzkrieged by sulfanilylguanidine is "phenomenal," Dr. Firor said. In one case the bacterial count dropped from 17,000,000 to 10,000. The reduction in number of bacteria was not this striking in all cases, but was always sufficient to enable the surgeon to perform a successful operation without infection.

Further advantage of sulfanilylguanidine is that it is less toxic than any of the other sulfa drugs. It is given by mouth. No patient has had nausea or vomiting from it.

The 15 or more patients who have now survived operations with the aid of the new drug required operations involving removal of a part of the alimentary canal or restoration of the canal after temporary drainages to the outside had been made in previous operations. Operations of this type, because of the risk of infection, are among the most difficult the surgeon undertakes. They account for about one-twentieth of all surgical operations, including even such common ones as removal of tonsils. The lower alimentary canal is one of the most frequent sites of cancer.

Sulfanilylguanidine, under the federal food and drug restrictions, has not yet been released for general sale, but is being distributed, Dr. Firor said, to a number of surgeons for further study of its effects. It is made by the Calco Chemical Company.

On the medical side, sulfanilylguanidine has been used with gratifying results in treatment of acute bacillary dysentery. Dr. Marshall expects to report soon on trials of the drug now being made in Puerto Rico, where dysentery occurs the year round. He said that it was used in a dysentery outbreak in Huntington, W. Va., this fall. The majority of 20 patients treated with sulfanilylguanidine got well within three or four days, while 20 patients who were not treated and served as controls were sick for two or three weeks. He said the drug looks most promising but that the number of cases treated so far is too small to make any claims that the new drug is a cure for bacillary dysentery.

Science News Letter, December 21, 1940

CHEMISTRY—MEDICINE

National Institute of Health Organizes Work on Chemicals

SEARCH for new and better sulfa drugs and for quinine substitutes will go forward at an accelerated pace in a newly organized unit of the National Institute of Health. The director of the Institute, Dr. L. R. Thompson, U. S. Public Health Service, announced the organization of this unit, the division of chemotherapy.

Dr. W. H. Sebrell, vitamin researcher and nutrition authority of the federal health service, will head the new unit as well as continue his researches on vitamins. The connection between vitamins and chemotherapy is not so remote as it may seem at first thought. Vitamins are, after all, chemicals, and they are used for curing disease, as in the case of the B vitamin, nicotinic acid, for pellagra.

The search for quinine substitutes has been stimulated by the threat of war cutting off the supply from the Dutch East Indies. There is no shortage of this malaria remedy at present, Dr. Sebrell stated, but the federal health service would feel easier about the situation if a made-in-America substitute were available.

Synthetic chemical remedies for malaria have been developed, but none of them so far is a completely adequate substitute for quinine from the bark of the cinchona tree.

Science News Letter, December 21, 1940

● RADIO

Highlights of the exciting news of science during 1940, as contained in Science Service's Review of the Year, will be presented by Watson Davis, director of Science Service, over the coast to coast network of the Columbia Broadcasting System, Thursday, Dec. 26, 3:45 p.m. EST, 2:45 CST, 1:45 MST, 12:45 PST. Listen in on your local station. Listen in each Thursday.

MEDICINE

New Blood Test Will Help Predict Course of Anemia

A NEW blood test which will help doctors diagnose the ailment in a patient with jaundice and also predict the course of the disorder has been devised by Dr. J. L. Irvin and Dr. C. G. Johnston, of Wayne University College of Medicine, and Dr. E. A. Sharp, of Parke, Davis and Company and the Harper Hospital, Detroit. The test might tell, for example, whether the jaundice is due to liver disease or to one, and which one, of several kinds of anemia.

The test, reported to the Central Society for Clinical Research, is said to give for the first time a method of making dependable quantitative determinations of the bile acids in the blood. The amount of these, the test shows, is about one-tenth to one-twentieth greater in anemias characterized by destruction of red blood cells than the amount needed to destroy normal red blood cells in the test tube.

Whether this concentration of bile acids in the blood is the cause of the red cell destruction is the next point to be determined.

Science News Letter, December 21, 1940

MEDICINE

New Hope for Conquest Of Drug Addiction

NEW hope for the conquest of drug addiction appears in a report from Dr. Donald Slaughter, Dr. J. Charles Parsons and Dr. H. Deane Munal, of Dallas, Tex. (*Journal, American Medical Association,* Dec. 14.)

The clue to a possible way of conquering drug addiction came from a study of a new method of using morphine to relieve pain in patients suffering severe injuries, heart disease or undergoing surgical operations.

Pain could be relieved with one-half the usual dose of morphine in most cases, the Dallas doctors found, when another drug, prostigmine methylsulfate, was given with the morphine.

Use of morphine for relief of pain during serious illness is said to be frequently followed by addiction to the drug. Of a series of 1,276 morphine addicts, 325 attributed their addiction to medical use of the drug.

One man, an ambulance driver, who became addicted to morphine originally through such medical use of it, came to the Robert B. Greene Memorial Hospital in San Antonio for a serious operation. Following the operation, the Dallas doctors report, he was given morphine in the dosage which he had been taking before the operation. Two days later, he was able to get along on about one-half this dose when given with prostigmine methylsulfate. The dose of morphine was further reduced in this way to one-third the original size of dose without the patient's knowing that there had been any change in the dose. By the sixth week the patient was getting about one-fourth the amount of morphine in a single dose and skipping every other dose without ill effects.

"During the time prostigmine methylsulfate was used with the morphine, no withdrawal symptoms were noted," the Dallas physicians report.

They suggest that this case "lends encouragement to the use of this drug in similar cases," and that they are investigating further the angle of tolerance and addiction.

Science News Letter, December 21, 1940

GENERAL SCIENCE

Langevin's Imprisonment Protested by Scientists

THE imprisonment of Prof. Paul Langevin, leading French physicist, is being protested by a score of scientists and educators, among them three Nobelists and six college presidents. They have joined in a telegram to French Ambassador Gaston Henry-Haye, made public by Prof. Franz Boas of Columbia University.

Science News Letter, December 21, 1940

ASTRONOMY

Russians Preparing Catalog Of 18,000 Faint Red Stars

RUSSIAN observatories have started work on the compilation of an astronomical catalog of about 18,000 faint red stars, according to Tass.

The position of these stars will be measured largely by photographic means in the seven Soviet observatories. Their positions, it is said, will be determined in comparison with those of the faint galaxies, which are distant Milky Way systems. Presumably specially sensitized photographic plates, sensitive to the red rays, will be employed.

These red stars are very numerous, and some are relatively near, but because they are so faint, most of them are unlisted in the catalogs now in use. These are mainly for the brighter stars.

Science News Letter, December 21, 1940

IN SCIEN

ASTRONOMY

New Sun Spot Group Crossed Center of Sun

A NEW group of spots on the sun passed across the exact center of the sun's face on Sunday, Dec. 8, U. S. Lyons, astronomer of the United States Naval Observatory, has reported. Radio disturbances and displays of the northern lights are sometimes associated with them.

These spots, which included 10 separate condensations, were on the solar equator. This is a rare position for spots at any time, he told Science Service, especially so long after the maximum of the 11-year spot cycle in early 1937.

At the time this group crossed the center of the disk, there were five others visible. A total of 36 spots could be seen, which covered an area of 17.5 square degrees.

Science News Letter, December 21, 1940

ZOOLOGY

"Fossil Snake" Turns Out Neither Fossil Nor Snake

A YARD-LONG, black creature recently sent to the Smithsonian Institution as a fossil snake turns out to be neither fossil nor snake, but something more interesting still. It is an Amphiuma, an almost limbless amphibian related to the salamanders, but so rare that years may go by without so much as a single one being added to museum collections.

Amphiuma is commonly mistaken for a snake, despite its lack of scales, because its legs have become so degenerate that they are practically invisible. Its eyes also are extremely small, and probably do the animal very little good. It commonly lives in muddy water, coming to the surface to breathe at intervals, and feeding on fish eggs and aquatic larvae. The females come ashore to lay their eggs, around which they remain coiled until they are hatched.

The present specimen was found under about 15 feet of mud in the Everglades. It probably was trapped by a slide of muck during the dredging work, and thus killed.

Science News Letter, December 21, 1940

NE FIELDS

NUTRITION

German Soldiers Fed Better Than Some Farm Children

GERMAN soldiers are fed much better than the children of Southern tenant farmers who are the potential defenders of democracy, Dr. Margaret Jarman Hagood, of the Institute for Research in Social Science of the University of North Carolina, told a conference on Tomorrow's Children there.

It is a striking commentary on the population policy of the United States, she declared, that this should happen at a time when Germany has limited food and the United States is clogged with surplus food products.

These tenant farm children are a valuable human resource, Dr. Hagood has concluded from her studies of them. They are emotionally stable, cooperative, and brought up with established habits of contributing to group endeavor.

Yet they suffer throughout their childhood from lack of proper nutrition, medical care, education, and general cultural stimulation.

Science News Letter, December 21, 1940

BACTERIOLOGY

Incense To Improve Air In Stuffy Raid Shelters

LONDONERS huddled together in air raid shelters may soon have smoke screens for protection against each other's germs, it appears from reports in the latest issue of the English medical journal, *The Lancet,* to reach the United States.

Cigarette smoke was the starter in this phase of chemical warfare against germs, but the smoke screens that may eventually be used are likely to be either incense, such as is used in churches, or a smoke emanating from smoldering cardboard which has been previously soaked in a solution of saltpeter and dried.

Paradoxically, the two most efficient germ-killing smokes out of six that were tested were incense, associated by many with thoughts of heaven, and the cardboard soaked in saltpeter, traditionally associated with the scorching fires of the nether regions. First Christian church use of incense, curiously enough, was when the church was hiding in the Catacombs, underground refuge which must have presented similar ventilation problems to the air raid shelters.

The tests were made of germ-killing smokes by Dr. C. C. Twort and A. H. Baker at the Portslade Research Laboratories, Sussex. They were originally researching on germicidal mists which might be used to aid ventilation and cut down risk of infection in air raid shelters. The question of tobacco smoke interfering with the germ-killing power of the mists was brought up and tested.

"It was found," they report, "that the smoke exhaled from an ordinary cigarette completely annulled the activity of the germicide which was sufficient, in the absence of smoke, to kill 50% of the test organism (germ) in five minutes and 100% in 15 minutes."

The tobacco smoke without the germ-killing mist, however, had no apparent effect on the germs.

The smoke from cardboard damped with a solution of potassium nitrate, or saltpeter, was next tested and subsequent tests were made on smokes from gear-grease heated on electric plates, cotton wool, oak and yang shavings damped with saltpeter and incense. All these had a killing effect on the germ tested. Germs from normal saliva were much more sensitive to the smokes than the test germs. This indicates that disease germs from the nose, throat and lungs, which would be an especial danger in crowded air raid shelters, would also be affected by the germ-killing smokes.

Science News Letter, December 21, 1940

ASTRONOMY

Winter Begins With Sun Farthest South

See Front Cover

AS the sun makes its apparent annual journey around the heavens, it is sometimes in the northern sky, sometimes in the southern.

Thus, for convenience, astronomers have long taken the time when the sun is farthest south as the beginning of the arbitrary division of the year called winter. This year the sun is farthest south, at the winter solstice, at 6:55 p.m., E.S.T., on Saturday, Dec. 21.

The cover photograph, taken by Gladys Muller in the Fels Planetarium, Philadelphia, shows the sun's position at this time. The dotted line, marked with dates, is the sun's path, the ecliptic; the solid line above is the celestial equator, directly above the equator of earth.

Science News Letter, December 21, 1940

PHYSIOLOGY

Anti-Gray-Hair Vitamin Hopes Reported Fading

HOPE of banishing the gray hairs of men and women in this weary world by food or a vitamin pill is considerably dashed by latest reports from scientific laboratories. (*See SNL,* Aug. 24)

Pantothenic acid, the B vitamin credited in earlier experiments with having a curative effect on the graying of hair, at least in rats, failed to prevent or cure gray hair even in rats in experiments reported by Dr. R. R. Williams. of the Bell Telephone Laboratories. (*Science,* Dec. 13.)

Dr. Williams is known for his isolation and synthesis of thiamin, or vitamin B_1, and is the brother of the discoverer of pantothenic acid, Prof. R. J. Williams, of the University of Texas. Describing his experiments, Dr. R. R. Williams concludes:

"In our experiments, neither pantothenic acid concentrates nor pure pantothenic acid exhibited a preventive or curative effect on the gray hair of rats, although the rate of growth and the length of life were greatly enhanced. Evidently, some other circumstances which we can not as yet define influence the occurrence of achromotrichia (loss of hair color)."

The diet fed the rats in his experiments, Dr. Williams points out, differs from that of other scientists who reported pantothenic acid cures of gray hair. Most conspicuous difference, he said, was the substitution of 8% butter for 2% corn oil. This might result in the rats getting a significantly different amount of another vitamin or food factor, but whether it would have any effect on the graying of hair is not stated.

Science News Letter, December 21, 1940

CHEMISTRY

"Prolon" Latest Addition To Names of New Fibers

GET acquainted with "prolon." It is a new name for what has been called "casein wool." Perhaps soon you will buy clothes, blankets, etc., made of it.

This name is the latest addition to the family which now includes nylon, vinyon, rayon, celanese, and the other so-called "synthetic" fibers.

It is suggested by F. C. Atwood, of Atlantic Research Associates. (*Industrial and Engineering Chemistry.*)

Prolon is made from casein obtained from milk, soybean or other sources.

Science News Letter, December 21, 1940

GENERAL SCIENCE

Dangers in World Situation Stimulate Effort in Science

Duty of Providing Continuity Essential for Progress Rests on Few Remaining Scientists Working in Freedom

SCIENCE in a world at war responds by stimulated and increased activity, declares Dr. Vannevar Bush, president of the Carnegie Institution of Washington, in the Institution's annual report.

The duty of carrying on and providing the continuity essential for the best progress, he says, rests mainly on the few remaining scientists who can still continue in freedom to extend basic knowledge in a turbulent world.

"Fortunately," continues Dr. Bush, "the emergency has brought a quickened pace and a new intensity in scientific activities throughout this country, even in fields which are remote from the preparedness program. When a nation is in danger, and this danger becomes fully appreciated by its people, slumbering loyalties are aroused, petty disagreements disappear, and simple patriotism regains its rightful place.

"A democracy may exhibit a confusing dissidence in times of peace, but the very freedom of expression which produces discord as each small group pursues its limited objectives acts powerfully to unite and stimulate when common self-interest becomes focused by a single clear threat. Mass thinking takes time to crystallize, and is accompanied always by disturbing impurities and contaminations, but the strength of the resulting product is very great.

"Science feels this influence early. The urge to do something for humanity, by improving its knowledge of its environment, is so allied to the urge to do something definite to protect one's country from aggression that all scientific effort responds to the stimulus. This is one of the reasons why fundamental scientific advance, and in fact basic intellectual accomplishment of many kinds, is often accelerated rather than retarded by national stress."

Science News Letter, December 21, 1940

Atomic Power Nearer

WHAT, in theory, might have proved a stumbling block in obtaining atomic power from the famous Uranium 235 seems removed, according to the report of the Institution's department of terrestrial magnetism.

U-235, it is believed, may be a useful power source if it can be isolated in sufficient quantities. When hit by an atomic fragment called a neutron, the nucleus of an atom of this kind of uranium splits into two parts, with liberation of energy, and the emission of more neutrons. These, in turn, might split other nuclei, and so on, in a chain reaction.

During 1939, Dr. Emilio Segre, at the University of California, found an unknown substance of which half decayed in 2.3 days, and which was not the result of a fission, or splitting. If "the 2.3 day substance arose also from U-235," says the report, "enough neutrons might be consumed by this non-fission process to prevent the propagation of a chain."

Dr. P. H. Abelson, of the Department of Terrestrial Magnetism, and his colleague, Dr. L. R. Hafstad, attempted to identify the mysterious substance, but could not do so. Recently, however, Dr. Abelson visited the University of California's laboratory at Berkeley. There, with Dr. E. McMillan's collaboration, he succeeded in showing that the 2.3 day process arises from element 93, of weight 239. This is one of the short-lived elements heavier than uranium, which do not ordinarily exist in nature. It in turn, originates from U-238, another form, or isotope, of uranium.

"Hence," this part of the report concludes, "the considerations regarding a possible chain-process using U-235 are clarified."

Science News Letter, December 21, 1940

Measuring Sun's Effect

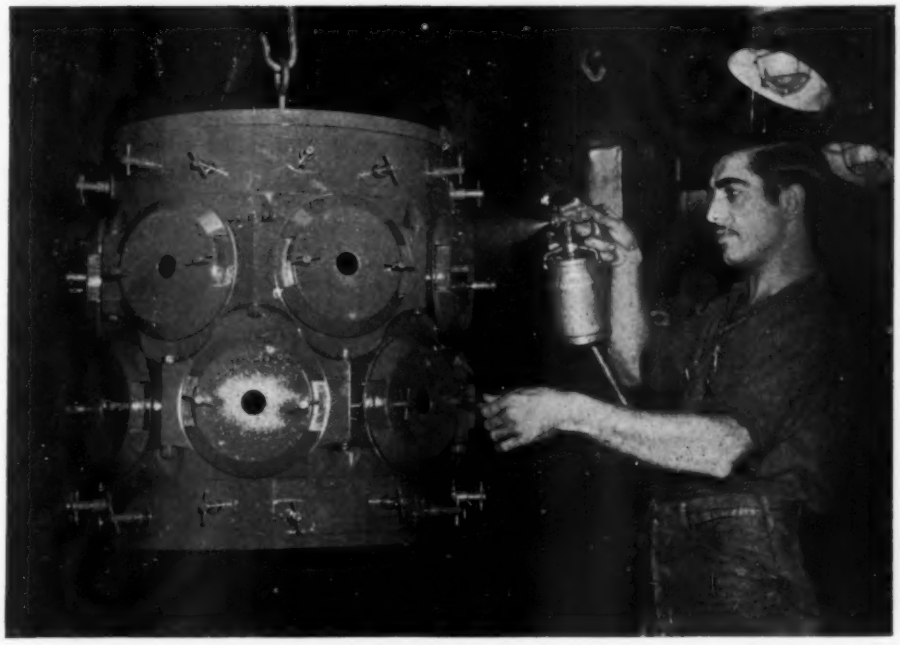
A NEW way of measuring the sun's effect on the earth, in causing magnetic disturbances, has been inaugurated, despite the fact that war threatened to stop the flow of much valuable information from other countries.

States the report:

"Through joint studies with the U. S.

SPEEDING DEFENSE

Moving on a conveyor chain are thousands of potential horsepower to propel the wings of war. In this photograph, taken in a new paint shop of the Wright Aeronautical Corporation in Paterson, N. J., are shown cylinders as they are dipped in the vat of finishing enamel in a continuous process. The painted cylinder at the extreme right is being whirled to remove excess paint.



SAFETY WITH EFFICIENCY

The workman, who is spraying a crankcase of a Double-Row Cyclone aircraft engine, does not wear a protective face mask because a powerful fan forces the unused spray towards a water curtain in the background that carries off the excess paint. This photograph is from the Wright Aeronautical Corporation's paint shop in Plant No. 2.

Coast and Geodetic Survey, the K-index was established as a valuable abstract of the magnetograms, providing even single observatories with good estimates of world-wide magnetic conditions. This index is now currently derived from data obtained by seven American-operated observatories, and is published weekly by Science Service. It gives, for the first time, a detailed homogeneous series for the intensity of solar corpuscular radiation affecting the earth, useful both in its terrestrial aspect—as in scientific or commercial radio work—and for its bearing on solar physics. Violent magnetic storms with K = 9 occur only a few times near a sunspot-maximum, but it is equally rare that any full 3-hour interval is perfectly free from disturbance. This means that the earth is almost constantly, even near sunspot-minimum, under the influence of (presumably solar) particles, weak as this influence may be at times."

Science News Letter, December 21, 1940

Embryo Growth Rates

STUDIES of the rate of growth of various organs in early stages of the human embryo have been made by an ingenious indirect method, described by Dr. George W. Corner, the new director of the Institution's department of embryology.

Since it is obviously impossible to make direct measurements when the whole embryo is not any larger than a millet seed, and besides has already been sliced into thin sections and mounted on a microscope slide, a different method has to be used. The one adopted by the Carnegie embryologists consists in tracing on paper of uniform thickness the exact outlines of the parts to be studied as they appear under high magnification, and then cutting out the outlined sections and weighing them on delicate balances.

Some of the things that have been discovered about two embryos in the fourth week of their development are: relatively enormous spread of nutritional surface, extremely small amount of heart tissue at this early age, and faster growth of brain than spinal cord even in the fourth week of human prenatal life.

Science News Letter, December 21, 1940

Compounds Between Stars

FOR a long time astronomers have known that the space between the stars is not as empty as it was once thought, but that certain elements in the form of very diffuse gases exist there. These are principally calcium, sodium, potassium and titanium.

Recent researches at the Mt. Wilson Observatory, the report announces, combined with theoretical studies at the Dominion Astrophysical Observatory in Victoria, B. C., show that there are compounds as well as single elements in interstellar space.

In spectrum photographs which analyze the light from distant stars have been found all the important lines that, it was predicted from theory, would result from the compounds CN and CH. The position of these lines shows that they originate between, rather than in the stars. CH and CN do not exist as separate compounds on earth, only in combination with other atoms. CH is a molecule which consists of an atom each of carbon and hydrogen; CN of carbon and nitrogen.

"It is highly probable," states the report, "that the two or three remaining unidentified sharp lines which are fairly prominent will also be found to be due to the molecules of familiar gases."

Science News Letter, December 21, 1940

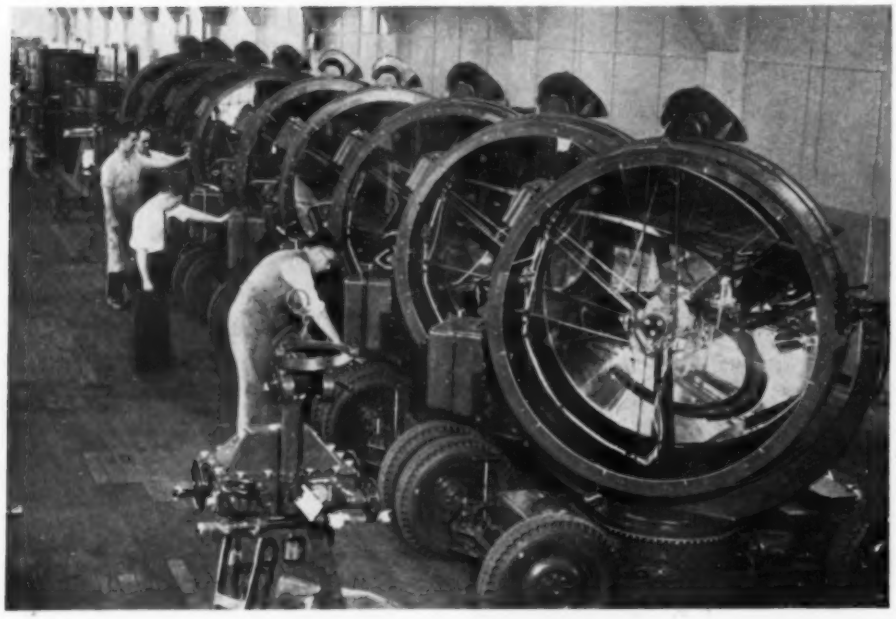
Colorless Corn Plants

ALBINO animals are interesting freaks, often valuable because of their rarity. Albino plants beyond the seedling stage are practically unknown, because they automatically starve to death, lacking as they do the green pigment, chlorophyll, necessary for the manufacture of basic foods.

Physiologists of the Institution, however, under the leadership of Dr. H. A. Spoehr, have been able to keep albino corn plants alive for four months and more, by feeding them on sugar and other nutrients. In this way they have begun to obtain an understanding of some aspects of plant nutrition hitherto inaccessible. It has been discovered, for example, that such plants can manufacture plenty of starch if supplied with ordinary cane sugar, a process hitherto considered impossible. It has also been found that they cannot get adequate nutrition out of glycerine and other compounds, which have until now been looked upon as possible plant foods.

Parallel experiments have been carried on with plants artificially albinized by putting them into the dark while still young. Sunflowers so kept on a diet of sugar and the necessary minerals have grown and even blossomed, producing normal yellow-rayed flowers although their leaves wholly lacked green color.

Science News Letter, December 21, 1940



SEARCHLIGHTS FOR DEFENSE

Their 800-million candlepower beams effective for a height of 5½ miles, these anti-aircraft searchlights are being turned out by the General Electric Co. at the rate of several a day for the U. S. Army. Glass of special toughness makes them immune to ordinary shock.

ASTRONOMY

Tail of Cunningham's Comet May Engulf Earth in January

But You Needn't Be Alarmed; Comet Tails Contain Little Material and Produce No Apparent Effects

CUNNINGHAM'S COMET, now coming into view in the western evening sky, may sweep the earth with its tail next month, Dr. Fletcher Watson, of the Harvard College Observatory, told members of the American Academy of Arts and Sciences meeting in Boston.

He explained it this way:

"On January 13 the comet will very nearly pass between the earth and the sun. Since the tail of a comet extends almost directly away from the sun, the tail of this comet will stream out in the general direction of the earth. Whether or not the earth will pass through the tail is still in dispute; first the comet must develop a tail nearly 60,000,000 miles long. Even then there is no reason for us to become excited for comet tails contain very little material and no effects of a possible collision can be apparent. In 1910 the earth passed through the tail of Halley's comet only a few million miles from the comet and nothing came of it."

So far, he stated, the tail is much shorter, less than a million miles in length. However, the greatest changes and development of a tail will come as it approaches the sun. On January 16, he said, it will be closest the sun, at a distance of 34,000,000 miles, less than the distance of Mercury.

Harvard astronomers, Dr. Watson told his audience, are making a special effort to obtain a complete sequence of observations of the appearance of the comet, and the character of its light. At the present time the light and other radiations are mostly from molecules of carbon and nitrogen.

"In the middle of December," he stated, "when the tail may begin to take shape, sodium will probably appear and other radiation may be detected as the comet nears the sun."

Cunningham's comet has been steadily brightening since its discovery in September. It can now be seen with the aid of binoculars near the star Albireo, in the constellation of Cygnus. The brilliant moon now offers some interference with the view, but by Christmas eve the moon will be out of the way. Then the comet, it is expected, will be seen easily with the naked eye near the star Altair, in the constellation of Aquila, the eagle, which is observed in the western sky soon after sunset.

Science News Letter, December 21, 1940

RESOURCES

Chile Hopes to Boost Nitrate Sales to U. S.

SEEKING new customers for nitrates, in the warring world's trade upheavals, Chile is casting a hopeful eye toward the United States, says a report to the American Council of the Institute of Pacific Relations.

The United States is now rated about 75% self-sufficient in nitrates, valuable in fertilizer and in making war explosives, and for other industrial processes. With shipping and trade hampered by war, Chile sees a good chance of replacing Germany, the United Kingdom and the Netherlands as one major shopping source for the missing 25%.

Revival of Chilean sales of nitrate to the United States, which sagged noticeably during depression years, would materially help in Chile's economic problems, since the European war is blamed for loss of about half of Chile's foreign sales of nitrate. Japan looks mainly to Chile for her imports of this material, but even if the long-drawn-out Far Eastern war increases Japan's purchases as expected, the amount that Japan buys is comparatively small.

Dramatically different is the present situation from the World War era, when Chile enjoyed the strategic position of being the world's main dependence for nitrates for explosives. Production in 1916 leaped to almost 3,000,000 tons. Since then, synthetic means of producing nitrate commercially have been chiefly responsible for a downward slide for Chile's nitrate sales. In 1933, Chile was supplying only 4% of the world's nitrate, but the industry, reorganized, has in recent years been improving its competitive position.

Science News Letter, December 21, 1940

A Swedish chemist is said to have found a method of *plating china* with thin metal, thereby making it stronger.

GENERAL SCIENCE

Deferment of Military Service Asked for Science Workers

Scientists' Efforts in Laboratories Worth More For Defense Than Target Practice or Gun Squad Drill

STUDENTS, research workers and teachers in scientific and professional fields that make vital contributions to national defense should be given deferred classification under the Selective Service Act, Dr. C. A. Dykstra, director of the Selective Service System, was informed in a joint statement by the National Academy of Sciences and the Subcommittee on Military Affairs of the National Committee on Education. Dr. Dykstra had requested an expression of opinion of these organizations, for use in formulating a policy regarding the disposal of scientists and their students in colleges, universities and research institutions.

The scientists consulted by Dr. Dykstra list six scientific fields in which work is being done of such importance that in their opinion the workers are doing more toward national defense than if they were carrying rifles or doing gun drill. These are: medicine and allied professions, biological sciences, chemistry, physics, geology and related earth sciences, and engineering in all its branches.

Commenting on the desirability of such deferments, the committee points out: "Experience of every nation engaged in the World War and the conditions under which the present conflict in Europe is being waged point directly to the necessity for proper employment of scientific personnel and of those competent to train such personnel, to a continuous supply of newly trained personnel, and to the penalties incident to assigning them in large numbers to purely military service where others without their special training can function equally well."

Particular stress is laid on the desirability of permitting students in such fields as medicine, dentistry, and pharmacy to finish their courses before they take up their military duties, because of the large demand for trained men in both the military and civil sectors, and because intensive specialized training cannot make up for a deficiency of qualified personnel.

"In all six fields," the statement continues, "university presidents should request deferment of members of the teaching staff who in their judgment are essential properly to maintain the efficiency of the institution in the continuous training of students necessary in the operation of the defense program or in the effective conduct of research and development problems assigned to the institution in connection therewith.

"The industrial laboratory and some graduate schools employ trained personnel often in group or team operations which require not only highly skilled individual scientists and engineers but likewise men accustomed to working together in close cooperation. Subtraction of a single key man from such a group may seriously handicap or even substantially destroy the efficiency of the group to function.

"The problem of the industrial and university research laboratory concerned with a present or prospective defense program is not only one of retaining an adequate number of highly trained research men, engineers and skilled technicians but also one of maintaining the integrity of research and development teams. This is because industrial research and development is a coordinated group activity.

"Research directors should request deferment of highly qualified men whose training and experience are such that their withdrawal will cripple the ability of the laboratory to function effectively in the defense program.

"In addition to trained scientists and engineers the industrial and university laboratory is largely dependent on skilled craftsmen, such as draftsmen, instrument makers, etc. Request for deferment of skilled men in these categories is indicated unless they can be replaced."

Science News Letter, December 21, 1940

GENERAL SCIENCE

Mergers in Research And Education Expected

MERGERS of American research and educational institutions can be expected in the future, as "a conservation movement in cultural philanthropy," states Frederick P. Keppel, president of the Carnegie Corporation, in his annual report.

There are more universities and colleges, and far more voluntary organizations for worthy purposes than the nation can possibly afford, Mr. Keppel declares. "In the years to come many of these are bound to disappear," he said, "and one of the most difficult duties that face the foundation is that of so directing its grants that its influence will be directed toward the survival of the fittest."

During the year 1939-40, the report shows, grants totaling $4,692,000 have been made by the Carnegie Corporation for library interests, adult education, the arts, research, and publications.

Science News Letter, December 21, 1940

IN SCIENCE

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QUEST B-2

Wellesley, Mass.

APPROACHES SPEED OF LIGHT

This new electron accelerator in its glass doughnut-shaped vacuum tube, gives electrons a speed approaching that of light. Dr. D. W. Kerst, of the General Electric Research Laboratory, designer of the instrument, is shown using an electroscope to measure the intensity of the radiation produced.

From Page 389

Reports from Finland suggested that there may be a fourth series of elements that disintegrate like radium.

A heavy isotope of sulfur, making up about four per cent of ordinary sulfur, was isolated in pure form for the first time.

Elements 93 and 94, heavier than uranium, formerly supposed to have the heaviest possible atoms, were obtained in the laboratory, one of which, it was reported, lasted for several days, while the other decomposed with greater rapidity.

Carbon isotope 14, of which half decays in 1000 years, was obtained by exposing ammonium nitrate to the rays of a cyclotron; it may prove important in biology because of its long life.

Liquids obtained from wood were seen as the raw material for a new chemical industry.

As had happened several times previously, the discovery of element No. 85 was announced, though it was not accepted by chemists, pending further confirmation.

New uses were found for nylon, among them photographic film and cords in tires.

A new plant was opened for the large scale synthetic manufacture of phenol, or carbolic acid, important chemical of the plastics industry.

A method was discovered by which coal and oil can be made in the laboratory from plant carbohydrates, thus accomplishing in a few hours what has taken nature millions of years.

Glycerine was made from petroleum by a new process.

EARTH SCIENCES

Many Earthquakes Occurred Rumanian Shock was Worst

A severe earthquake caused widespread death and destruction in Rumania on Nov. 10; during the year there were 37 other quakes sufficiently severe to register themselves on distant seismographs.

The U. S. Weather Bureau initiated the making and broadcasting of five-day weather forecasts, based largely on air mass analyses.

U. S. Coast Guard cutters served as "weather ships," taking observations at sea to replace those formerly sent by merchant ships now silencing their radios because of the war.

A violent snowstorm that suddenly struck the upper Mississippi valley and the Lake states in mid-November caused the death of many duck hunters and sailors and seriously disrupted traffic.

The most severe magnetic storm since 1921 occurred on Easter Sunday, seriously interfering with wire and radio communications.

The nearly complete fossil skeleton of a Uintatherium, giant six-horned beast of 30 million years ago, was discovered in Wyoming.

The practically complete skeleton of a young elephant of Pliocene date was unearthed in Siberia.

Wormholes in fossil wood, a great geological rarity, were discovered in a petrified forest in China.

Great Smoky Mountains National Park was dedicated by President Roosevelt on Labor Day.

ENGINEERING AND TECHNOLOGY

Three-Month Predictions Will Aid Broadcasting

It was found possible to predict three months in advance the best frequencies to use for dependable radio transmission.

Recorded music of orchestra, organ and choir was reproduced with its original tonal range and spatial sense, and a tenfold greater range of loudness.

Coastal-harbor radio stations opened at Wilmington, Charleston, Tampa and Galveston make radio telephone service available to small watercraft along the entire ocean and Gulf coast of the United States.

Direct radio telephone channels from the United States were established during 1940 to LaPaz, Berlin, Berne and Madrid.

The VU, a new unit of sound volume for electrical circuits, was adopted by telephone engineers, broadcasters, and instrument manufacturers.

The Federal Communications Commission permitted the high-fidelity frequency modulated radio to go into use, but held up authorization of commercial television until there was more agreement concerning standards.

Television by radio in natural color, using a single channel, was accomplished.

A television program covering the Republican convention in Philadelphia was transmitted over the coaxial telephone cable to New York and then broadcast by radio.

Simple television apparatus was introduced, making it possible for radio amateurs to experiment in this field.

Television views were transmitted from an airplane to the ground.

New dustless and sliverless copper was developed to reduce short circuits in electric wiring.

New dams in the Pacific northwest gave that part of America the cheapest commercial electric power.

The Pennsylvania turnpike, a 160-mile road without crossroads, was opened between Harrisburg and Pittsburgh.

The biggest steam turbine made since 1930, capable of 80,000 kilowatts, was completed.

New values of the viscosity of steam at high pressures and temperatures were made available.

The largest conveyor belt system carried 1,100 tons of gravel, sand and crushed rock per hour a distance of 9.6 miles to Shasta Dam.

A new electric phonograph was introduced in which reproduction is accomplished with a dancing light beam.

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A suspension bridge near Tacoma, Wash., was opened, becoming the third largest in the world, but a few months later it collapsed in a gale.

MATHEMATICS

Four Colors Suffice For 35 Regions on Sphere

In the so-called four-color problem it was shown that any map on a sphere containing 35 or fewer regions can be colored with four colors; this is an extension of 4 beyond the number 31 reported in 1938.

It was shown that a square can be cut up into a finite number of smaller squares no two of which are of the same size; for many years it had been supposed that this was impossible.

A computing machine was developed for multiplying and dividing complex numbers, constructed largely of telephone relays and switches.

An automatic machine to play the mathematical game of Nim was constructed, and exhibited at the New York World's Fair.

The fundamental algebraic notion of a group under an operation of multiplication was widened in various ways, notably in order to include cases where the operation acts on more than two elements.

New results were obtained in the theory of fields, particularly modular fields and p-adic number fields.

Some of the algebraic methods which had been applied previously to the difficult problem of smoothing-out the singular points on two-dimensional surfaces were successfully extended to higher-dimensional surfaces.

New and definitive contributions to lattice theory appeared, emphasizing the very wide applications of lattices to the combinations of given algebraic systems; to the subspaces of geometric spaces, both Euclidean and non-Euclidean; to the basic concepts of topology; and to the theory of probability with important bearings on modern physics.

In mathematical statistics, the problem of lengths of runs was extensively investigated.

Considerable advance was made in the theory of integral equations, particularly for a type of integral equation encountered in many problems of dynamics and quantum mechanics.

Extensive use was made of fractional differentiation and integration in the evaluation of definite integrals.

The notion of an integral was extended from ordinary space to various types of abstract spaces, in particular to those known as Banach spaces.

A new notion of curvature was advanced, a strictly local property of a space, which can be integrated over the whole space to give a result which is closely connected with the topological structure of the space.

Necessary and sufficient conditions were obtained for the regularity of Hausdorff transformations of a certain type in terms of the related continued fraction.

MEDICAL SCIENCES

Measles Vaccine Developed; Thiamin Aids Alertness

Development of a new measles vaccine and its success in clinical trials on a small group of children was announced.

New evidence of the importance of thiamin, or vitamin B_1, not only for preventing disease and minor degrees of ill health, but for increasing the alertness and capacity for physical work in persons of ordinary good health was obtained from diet studies on human subjects.

Lack of riboflavin, one of the B vitamins, in the diet was discovered to cause keratitis and cure of the condition by riboflavin was announced.

Synthesis of pantothenic acid, one of the B vitamins, and its identification as an adrenal gland-protecting factor for rats, and its usefulness in human nutrition were announced.

A new vaccine from influenza and distemper viruses was found to give ferrets solid immunity against several strains of influenza and was tried on humans during an epidemic in Puerto Rico but without definite conclusions.

A second virus cause of influenza, to be known as Influenza B virus, was discovered and found to cause epidemics in alternating cycles with Influenza A virus.

Sulfathiazole was announced as an improved remedy for pneumonia and as a valuable remedy for staphylococcal infections and as a possible cure for bubonic plague.

Evidence of regression of cancer achieved by treatment of patients with fast neutron rays from the cyclotron was reported.

Neutrons slowed down by boron proved five times as effective as fast neutrons in destroying cancer tissue in test-tube experiments and cured transplanted cancer in mice.

"Air bends" or aeroembolism, occurring in rapid ascents to high altitudes, can be prevented by oxygen inhalation treatment before taking off.

Signs of heart damage due to oxygen lack were discovered in flyers at altitudes as low as 5,000 feet.

A diet, adequate to provide adequate nourishment for a year at a cost of less than two dollars per year, has been announced as satisfactory except for the deficiency of one vitamin, which can be provided with the addition of tomato juice, and calories and bulk to satisfy stomach hunger.

A "pocket size" emergency oxygen inhalation apparatus for parachute descents from high altitudes was devised.

Five groups of eye defects significant in certain types of work and new tests for detecting them were announced together with a theory of job selection on an eyesight basis.

A vanishing cream that protects against poison ivy was developed.

A serum for treating Rocky Mountain spotted fever was developed.

Two kidney extracts were reported to give relief from high blood pressure.

Isolation from soil bacilli of chemicals capable of destroying a large range of pathogenic micro-organisms and promising results with the use of one of them, gramacidin, in treatment of chronic bovine mastitis, were announced.

Successful vein grafting or splicing was accomplished with the aid of the anti-blood clotting chemical heparin.

Sulfanilylguanidine was announced as a promising remedy for bacillary dysentery and other intestinal infections.

A muscle-splicing operation, in which bands of diseased tissue within the muscles were removed, was devised for rehabilitating useless muscles of infantile paralysis victims.

Test-tube transformation, for the first time, of living mammalian cells into cells of apparently radically different type which may be cancer cells was achieved by methylcholanthrene treatment in search for the secret of the change of normal cells into cancer cells and suggested that a change in the cell membrane may be crucial to the transformation of normal to cancer cells under chemical treatment.

Cancer-causing substances, it was announced, have been extracted from the presumably healthy livers of cancer patients and, apparently for the first time, from human breast cancers.

Cancer cells were turned toward normal in metabolic activity by starvation treatment of the cells aided by insulin.

Financial aid to indigent cancer patients and also establishment and maintenance of cancer clinics, hospitals or laboratories will be possible through the reorganization this year of the American Society for the Control of Cancer.

Zinc peroxide treatment was used successfully to relieve pain and clear up infected ulcers in hopeless cancer patients, enabling some of them to continue with needed irradiation treatment.

A new route by which cancer cells and disease germs can spread through the body, by-passing the heart and lungs, and thus in the case of cancer giving a false sense of security in prognosis based on lung involvement, was discovered in the valveless vertebral veins.

Discovery that glutamic acid occurs naturally in both right-handed and left-handed forms refuted the idea that appearance of the left-handed form in the body was an indication of cancer.

A grant of $35,000 yearly for two years was made by the National Foundation for Infantile Paralysis to the National Research Council for fellowships in infantile paralysis research.

Antibodies that can inactivate influenza virus were discovered in human nasal secretions and seen as a possible protection along with a change seen during influenza in the cells of respiratory mucous membrane of ferrets.

Cirrhosis of the liver in rabbits was produced by a diet lacking in a substance found in yeast and thought to be choline.

Evidence showing that the liver is of funda-

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mental importance in the formation of prothrombin and in the metabolism of vitamin K was reported,

Improvement in Parkinson's disease (paralysis agitans) following treatment with pyridoxine, or vitamin B_6 was announced.

Success in carefully controlled treatment of prostate gland disease with the synthetic female sex hormone, stilbestrol, in dogs was announced.

A hyperimmune rabbit serum for treatment of equine encephalomyelitis was developed and found to give good results in laboratory animals.

Aluminum treatment of silicosis in human patients was begun and early encouraging results were reported.

Success in treatment of muscular dystrophy, amyotrophic lateral sclerosis, peroneal muscular atrophy and amyotonia congenita with vitamin E was reported.

The mouse anti-baldness dietary factor was identified as inositol.

Poor diet was found to decrease the resistance of young rats to a neurotropic virus, suggesting that dietary deficiency may be a factor in virus diseases such as infantile paralysis.

Treatment with vitamins E and B was reported to have restored the function of muscles disabled by infantile paralysis and other diseases.

Thiamin was discovered to be an antidote for the depressing effects of tropical heat.

A new role for thiamin, that of protecting blood vessels from damage, was discovered.

Deficiency of vitamin B_6 (pyridoxine) and potassium caused heart muscle damage and death in young pigs and rats.

Discovery of a new, unidentified B vitamin, necessary to prevent slipped tendon disease or perosis in chicks, was announced.

Sulfamethylthiazole was announced as a cure for staphylococcal septicemia and as a pneumonia remedy.

Sulfanilamide was reported to prevent scarlet fever and to be successful in treating recurrent lymphocytic choriomeningitis and an eye infection from the virus of venereal lymphogranuloma.

Electron microscope studies showed that the streptococcus has a rigid outer membrane accounting for the grouping of these germs in chains.

A world-wide influenza epidemic was predicted by many authorities for 1940-1941 on the basis of 25-year pandemic cycles.

Encouraging results in attempts to protect animals against infantile paralysis by injecting a vaccine into the brain and spinal cord were announced.

Tonsillectomy appeared to predispose to infantile paralysis, a survey showed.

Infantile paralysis epidemics were linked with a recent trend in sewage disposal methods, especially in small towns; and chlorination of drinking water and swimming pool water as now practised was found insufficient to kill the infantile paralysis virus.

Successful vaccination of monkeys against infantile paralysis with a virus that causes the disease in mice was reported.

First proved epidemic in the United States of Australian "Q" fever was announced with the suggestion that the organism is the cause of many cases of atypical pneumonia.

An experimental vaccine for protection against "Q" fever was developed.

A record of 401 operations for relief of Ménière's disease with one death and 400 permanent cures was announced.

Relief of Ménière's disease by the chemical histamine in 49 patients was announced.

A hitherto unknown enzyme in the blood which breaks down heroin and other morphine compounds was discovered.

Apparently permanent cure of diabetes in cats was achieved by insulin treatment in experiments giving new knowledge of the tissue damage in diabetes and emphasizing the importance of early, thorough treatment of the disease in humans.

Inhalations of 100% oxygen were found to give relief from attacks of angina pectoris.

Muscle storage of iron was discovered for the first time in studies with artificially radioactive iron.

A new pneumonia germ, pneumococcus Type 33, was discovered and a serum for treating it was prepared.

Large scale field trials of two typhus fever vaccines were started in Central Europe.

A research unit to be concerned entirely with problems of aging was organized at the U. S. National Institute of Health.

Promin, a new sulfa drug, showed promise as a remedy for experimental tuberculosis in guinea pigs.

Isolation of extracts from the kidneys, one of which lowers blood pressure, another of which raises blood pressure, others which produce thrombosis and still others which produce hemorrhage, is expected to throw light on the role of the kidneys in various manifestations of cardiovascular disease.

England added thiamin to its flour as a war nutritional measure.

PSYCHIATRY AND PSYCHOLOGY

Electric Shock Therapy Given First U. S. Trials

Electric shock therapy, a method of treating mental disease by passing an electric current directly through the brain, was introduced in the United States.

The ink blot test, familiar as a measure of imagination, was used successfully to predict which mental patients would respond to the new insulin shock treatment, and to distinguish neurotics from those with uncomplicated mental disease.

Actual measurement of how an individual behaves when approaching a nervous breakdown was made possible by a new technique developed in experiments with animals.

The Stanford Binet, familiar test for measuring intelligence, can be adapted to detect early stages of mental disease, it was reported.

Abnormally slow brain waves, rare in normal children, were found to be relatively common among problem children.

Brain waves were put to practical use in the rejection of would-be pilots found to have brain waves believed characteristic of epilepsy.

Strychnine dropped into the eyes was found to improve vision impaired at high altitudes, indicating that the narrowed field of vision of a person suffering oxygen deprivation is a matter of eyesight rather than mere attention.

With a special pneumatic grip on the control stick, it was found possible to measure the tenseness of student pilots while making various maneuvers during flight, take-off and landing; overtense individuals make poor students, it was found.

Lights flashing in the eye were found to produce electric waves in the brain (not the brain waves originating there) so sharply localized that it was possible to map the area governing vision by electroplotting the exact position where the signals could be picked up.

Learning ordinarily requiring the important temporal area of the brain's cortex can take place sub-cortically, it was demonstrated when the temporal area in animals was either rendered useless by the drug curare or completely removed.

Airsickness, which can be produced in the laboratory by mild electric shock through the ears, can also be produced by "conditioning" it was found when simultaneous ringing of a bell with the shock taught individuals to sway or fall over when later they heard the bell alone.

Theories of learning were affected by discovery that an individual conditioned in deep hypnotic sleep by smelling creosote during the ringing of a bell will afterwards in waking state have a vivid image of the odor of creosote whenever he hears that bell, and without any remembered associations.

Learning by organizing material in close connection with the situation was demonstrated to be more efficient and subject to transfer than ordinary rote memorizing or verbal generalizing.

All individuals, regardless of age, sex, or state of mind are equally sensitive to pain, it was discovered by a new technique which opens the door to new laboratory experiments on the effects of pain-relieving drugs.

Hunger does not exist as a single manifestation, it was found; instead there are at least 10 specific hungers: for protein, fat, carbohydrate, water, oxygen, salt, phosphorus, sodium, calcium and the vitamin B complex.

The span of visual attention, that is the number of dots that can be seen in a fraction of a second, was shown to depend on the exposure time and the light intensity; the shorter the exposure time, the greater is the light intensity required.

The excitability of the visual receptor was found to be cyclic, even with constant stimulation; at the end of the cycle the receptor discharges, and thereafter requires recovery during another cycle before it discharges again.

When a uniform area of the eye is stimulated by light, it was found that there is greater nervous excitation near the center of the area than at the edges.

Sounds can be heard as coming from different directions, not only horizontally as has long been known, but also vertically, it was found, provided you turn your head while listening.

Color vision and ability to distinguish small differences of color were observed to be equally developed in man and in chimpanzee, though man does somewhat better with the reds.

Monkeys without the important frontal lobes of their brains, were found able to use a combination of tools in a way previously considered exclusively human, but were unable to assemble the tools from different sides of the cage—a problem within their ability when they had the frontal lobes.

Five leading psychological organizations appointed representatives to cooperate with the National Research Council in making the services of psychologists available to the government in the present emergency.

A number of organizations became concerned with the psychological factors involved in morale; a conference of 25 psychologists discussed and reached an agreement concerning certain factors involved.

Public opinion polls reduced their average error between 2 and 3 per cent in predicting the outcome of the November elections, thus establishing themselves with some security as perhaps the first technique in the social sciences to achieve scientific prediction of coming events.

A method was developed for classifying body types which may make it possible to solve certain long-standing problems of relation between development and bodily constitution.